

WHAT IS CLAIMED IS:

1. A powered closure drive system for opening and closing a closure mounted to a vehicle, said powered closure drive system comprising:

an articulated strut extending between one end adapted to be pivotally coupled to the vehicle and an opposite end adapted to be pivotally coupled to the closure, thereby defining a static pivot axis and a movable pivot axis at each end thereof;

a motor assembly operatively coupled with said articulated strut for selectively displacing said movable pivot axis so as to adjust mechanical advantage provided by said articulated strut and, thereby, effect opening and closing of the closure relative to the vehicle.

2. The powered closure drive system as set forth in claim 1, including an arm pivotally coupled to said articulated strut to define said movable pivot axis.

3. The powered closure drive system as set forth in claim 2, wherein said motor assembly includes a drive motor for rotatably driving said arm about an arm axis, thereby adjusting said mechanical advantage provided by said articulated strut and, in response, effecting opening and closing of the closure relative to the vehicle.

4. The powered closure drive system as set forth in claim 3, wherein said motor assembly includes a gearbox operatively coupled between said drive motor and said arm to reduce the rotational speed of said drive motor.

5. The powered closure drive system as set forth in claim 4, wherein said motor assembly includes a transmitting shaft extending between said drive motor and said gear box for delivering torque therebetween.

6. The powered closure drive system as set forth in claim 5, wherein said transmitting shaft is flexible.

7. The powered closure drive system as set forth in claim 6 wherein said articulated strut includes a locking structure therein for selectively locking said articulated strut in any one of a plurality of extended positions.

8. The powered closure drive system as set forth in claim 7 including a control system for controlling the operation of said motor assembly.

9. The powered closure drive system of claim 8 further comprising a second strut extending between said pivot axes and the closure, which cooperates with said articulated strut for moving the closure between the open and closed positions.

10. A method for driving an articulated strut to automatically move a closure between closed and open positions thereof, the method comprising the step of increasing the mechanical advantage provided by the articulated strut by changing the angular orientation of the articulated strut using a motor assembly, such that the articulated strut is biased to overcome and extend against the weight of the closure and, thereby, move the closure toward the open position.

11. The method of claim 10, further comprising the step of maintaining the articulated strut in an extended position while moving the articulated strut using the motor assembly to move the closure to the open position thereof.

12. The method of claim 11, further comprising the step of releasing a latch mechanism that maintains the closure in the closed position prior to initiating the move of the closure to the open position.

13. The method of claim 12, further comprising the step of decreasing the mechanical advantage provided by the articulated strut while the closure is in the open position by changing the angular orientation of the articulated strut using a motor assembly, such that the weight of the closure overcomes the bias of the articulated strut and, thereby moves the closure toward the closed position.

14. The method of claim 13, further comprising the step of locking the latch mechanism after the closure has moved to the closed position.

15. The method of claim 14, further comprising the step of changing the angular orientation of the articulated strut with the motor assembly such that the closure may be operated manually between the open and closed positions against the extending bias of the articulated strut.

16. A liftgate operating mechanism for articulating a liftgate of a vehicle between an open position and a closed position, the liftgate mounted to a body of a vehicle for articulation about a hinge axis and having a strut for supporting the liftgate in the open position, the operating mechanism comprising:

a mounting plate adapted for fixed attachment onto the vehicle;

a reversible drive motor fixedly secured to said mounting plate;

an arcuate rack mounted on said mounting plate, said rack having a series of gear teeth,

a crank arm adapted to be pivotally mounted on said mounting plate to be pivotally movable between a "home" position and an operative position, said crank arm pivotally connected to the strut; and

a series of planetary gears drivingly engaged between said drive motor and said gear teeth of said rack, whereby selective energizing of said drive motor effects said pivotal movement of said crank arm effecting opening and closing movement of the liftgate, said planetary gears rotatably mounted on said crank arm for movement therewith between the home and operative positions.

17. A liftgate operating mechanism as set forth in claim 16 wherein said crank arm extends between a proximal end and an opposite distal end.

18. A liftgate operating mechanism as set forth in claim 17 where said distal end of said crank arm is pivotally coupled to said strut.

19. A liftgate operating mechanism as set forth in claim 18 including an arm pivot pin pivotally interconnecting said proximal end of said crank arm to said mounting plate.

20. A liftgate operating mechanism as set forth in claim 19 wherein at least one of said planetary gears is rotatably coupled to said arm pivot pin.

21. A liftgate operating mechanism as set forth in claim 20 including a worm gear coupled between said reversible drive motor and said planetary gears for transferring torque therebetween.

22. A liftgate operating mechanism as set forth in claim 21 including a spring assist member connected between said crank arm and the body of the vehicle for assisting said drive motor in driving said crank arm between said operative and home positions.

23. A method of powered articulation of a liftgate of a vehicle between an open position and a closed position, the liftgate mounted to a body of a vehicle for articulation between the open and closed positions and having a strut for supporting the liftgate in the open position, said method comprising:

providing the strut with a movable lower pivot point;

unlatching the liftgate;

moving the pivot point from a “home” position to extend the strut from a retracted condition to an extended condition and, thereby increase the mechanical advantage provided by the strut;

driving the pivot point back to the “home” position, thereby moving the liftgate to the open position;

driving the pivot point away from the “home” position, applying a closing force on the liftgate to move the liftgate to the closed position;

cinching the liftgate to a latched condition; and

driving the pivot point back to the “home” position to contract the strut to the retracted condition.